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FORMALIZED INFORMATION FEEDBACK AS A SUBSTITUTE FOR FEE COLLECTION IN A MILITARY
HEALTH CARE DELIVERY SYSTEM: A CONCEPTUAL UNDERPINNING FOR PROGRAM DEVELOPMENT

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*This paper was originally drafted in 1972 while the author served as a psychologist assigned to Silas B. Hayes Army Hospital, United States Army Training Center, Infantry, Fort Ord, California.

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Synopsis.—From the analysis made and the studies cited, an approach to improve the health care delivery system in a military setting is deduced. The paper provides the rationale, and the theoretical and empirical justification for proceeding with the construction of a specific plan for program development in the area of health care delivery in a socialized medicine context. The thesis is advanced that social approval and health care services are exchanged in a manner analogous to the exchange of economic goods. In general, the approach would be to develop means for acquiring "evaluative" information from health care recipients on the nature/quality of services received. This information would be fed back to the health care providers on a rapid, continuous, systematic basis. Such information processing and distribution would, in effect, become a partial substitute for, and serve many of the same functions as, fee payment and fee collection in the private medicine model. In so doing, formalized information feedback could be expected to have balancing and stabilizing effects upon the exchange processes which occur within the health care delivery system, and, simultaneously, improve the quality of the services rendered. Indicators which would reflect health care system effectiveness (such as hospital infection rates, incidence of iatrogenic illness, system usage, "reputation" of facility, morale of staff, etc.) should be developed and tracked to permit study of the effectiveness on overall system functioning of the formalized information feedback innovation.

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It is generally recognized that the practice of socialized medicine, of which American military medicine is but one example, is characterized by a different set of events than the practice of private medicine. Examination of basic differences between these two modes of health care may serve to elucidate the complexities of the health care delivery process in general. Such a comparison may also identify at what points and in what ways a given health care delivery system might be constructively modified.

This paper begins with a description of resource flow under the two contrasting modes of health care delivery, public and private. This leads to a discussion of social exchange theory and its possible contribution to understanding some of the specific behavioral transactions in the health care delivery process. Reinforcement theory is then approached for further support in deducing a conceptual approach for innovation in a military health care delivery system.

Resource Flow in Health Care Delivery

In the broadest sense, a health care delivery system may be viewed as a man-machine network which ingests resources from the environment, acts upon and transforms these resources in some way, and then delivers the transformed "product" to recipients.

The ingested resource is money. The transformation process can be conceptualized as involving two major phases: (1) exchanging the ingested resource (i.e., money) for human and material resources and (2) organizing, arranging, and "packaging" these human and material acquisitions in a particular fashion. The product is health care service and may be noted to have both tangible and intangible aspects.

There are, then, three primary functions in the health care delivery system: ingestion of resources, transformation of resources, and delivery-receipt of the transformed resources. These functions are common to socialized and private medicine. However, the executive agent for each of these functions and the pattern of resource flow differ in the two systems. Figure 1 is meant to illustrate major contrast in the two health care delivery models with respect to resource ingestion and processing.

Insert Fig. 1 about here.

In the case of socialized medicine, the ingestor of the system is a governmental body. Money, the initiating resource for the system, flows in the form of taxes to the ingestor. The governmental body also begins the transformation process by, for example, exchanging tax dollars for personnel and supplies. The medical agency completes the transformation by, for example, the personnel behaving in prescribed ways or by utilizing the supplies and equipment in a prescribed manner. Resource flow is completed at the time the "product" (health care service) is delivered to the patient. It is important to note that there is an incomplete loop in the resource flow circuit: The initiating resource (money) comes from sources in the environment other than the recipient of the health care service.*

*It may be argued that insofar as the patient is also a taxpayer his tax dollars serve a loop-closing function in the socialized medicine model. However, such contribution to the initiating resource of the system is so removed in time and space as to have lost any direct, contiguous connection with the services received.

In private medicine, the ingestion and transformation functions occur under the same roof: the medical agency that delivers the services. Also intrinsic to the private medicine model is that the patient provides (or, in the case of insurance-supported payment plans, triggers) the initiating resource to the ingestor. This is of crucial importance in our analysis since this event forms a feedback loop and thereby creates an interdependence among system components. Such component interdependence is incomplete in the socialized medicine model.

Miller (1972, p. 3) notes "A system does not form associations [i.e., does not learn] without feedback . . . " And, again "There is no learning without feedback of results" (p. 116). Miller also notes that nonprofit service organizations, such as governmental agencies, are particularly adept at allocating resources on the basis of cost analysis (i.e., budget expenditures and priorities) rather than on the basis of quality of service rendered. Miller alleges that this is because cost data is the distributor's only feedback source. Ordinarily the nonprofit service agency has no feedback data on quality of service rendered (Miller, 1972, p. 115).

From the above analysis it is concluded that a major defect in the socialized medicine health care delivery system resides in the truncated resource feedback loop. Feedback loops do of course occur in the application of socialized medicine, notwithstanding the schemata in Figure 1. The locus of such feedbacks is in the delivery-receipt end of the health care chain of events, rather than in connecting receipt of service back to ingestion of resource. By default such feedback signals are thrown almost exclusively into the interpersonal/behavioral/physiological realm. Let us, then, now

turn to social exchange theory to sharpen the focus of what can be expected to transpire between the medical agency and the patient in a health care delivery system. In doing so we must first provide a general introduction to social exchange theory.

Social Exchange Theory

Homans (1961) was one of the first writers to think in terms of quantifying the social exchanges which take place in an encounter between two people. He postulated:

A man in an exchange relation with another will expect that the rewards of each man be proportional to his costs--the greater the rewards, the greater the costs--and that the net rewards, or profits, of each man be proportional to his investments--the greater the investments, the greater the profits (p. 232).

Homans accompanied this thinking with the concept of distributive justice. When the exchange relation is as described in the quotation above, justice is distributed equitably between the two parties. When the exchange relation is to one party's advantage, justice is distributed inequitably and the exchange relation is thrown into a state of disequilibrium. As a consequence each man's costs, rewards and investments are forced to realign themselves toward a state of balanced reciprocity, or the exchange which takes place between the two parties will terminate.

Adams (1963, 1965) tightened Homans' proposition by suggesting that the exchange relationship can be assessed in terms of what each of the parties put into the exchange compared with what each of the parties get out of the exchange:

inequity exists for Person whenever he perceives that the ratio of his outcomes to inputs and the ratio of Other's outcomes to Other's inputs are unequal (1965, p. 22)

so that if

$$\frac{\text{Person's outcomes}}{\text{Person's inputs}} = \frac{\text{Other's outcomes}}{\text{Other's inputs}}$$

the exchange is said to be on a stable, equal basis and distributive justice occurs. (Note: It is the ratios that must be equal, not the absolute values of the outcomes or inputs of each). But if

$$\frac{\text{Person's outcomes}}{\text{Person's inputs}} \neq \frac{\text{Other's outcomes}}{\text{Other's inputs}}$$

distributive justice is violated and the smoothness of the exchange relationship is jeopardized.

Adams (1963, 1965) mentions several consequences that are likely to ensue if the outcomes/inputs ratios are unequal. If Person's ratio is less than Other's ratio, Person has these alternatives in his attempt to restore equilibrium to the exchange process:

- a. Become angry (i.e., try to get Other to increase Other's inputs; or, try himself to reduce Other's outcomes).
- b. Decrease his inputs.
- c. Try to increase his outcomes.
- d. Change his frame of reference by which he judges inputs and outcomes.
- e. Leave the field.

(If Other's ratio is less than Person's ratio, Other could of course be expected to behave similarly.)

If Person's ratio is greater than Other's ratio, Person may:

- a. Feel guilty (i.e., try to get Other to decrease Other's inputs; or try himself to increase Other's outcomes).
- b. Increase his inputs.
- c. Decrease his outcomes.
- d. Change the frame of reference by which he judges inputs and outcomes.
- e. Cognitively distort his own inputs and outcomes (rationalize his low input; deny his high outcome).

(Again the converse is predicted: If Other's ratio is greater than Person's ratio, Other will behave similarly.)

Adams conceives of inputs as those things brought into the social exchange. In the case of the industrial worker, inputs may include such things as age, skill, education, experience, previous work history, and amount of effort expended on the job. Outcomes are rewards or benefits: such things as pay, symbols of status, recognition, power/influence, intrinsic job satisfaction, time off, and other things perceived as "rewarding."

Social Exchange Theory Applied to Health Care Delivery Systems

Social exchange theory has been used to analyze the dynamics of social conformity (Nord, 1969a) and of leadership (Jacobs, 1971). Herein an attempt is made to establish correspondence between social exchange theory and health care delivery systems with a view toward identifying recipient and provider behaviors and defining under what conditions these behaviors may be expected to occur.

To facilitate discourse, Table 1 has been prepared. It lists some principal inputs (IN) and outcomes (OUT) in the most generic health care delivery transaction. Let Person (P) stand for the health care recipient, or patient, and Other (O) stand for the health care provider, or physician/medical agency.

Insert Table 1 about here.

While it may be possible to obtain empirical weightings for each of the IN and OUT elements in Table 1 via "importance rating" procedures, let us arbitrarily assign a weight of 2 to each of the "a" through "e" elements for some Point One in time.

Were we to calculate outcome:input ratios given these arbitrary weightings, the algebra would look like this:

$\frac{P \text{ OUT}}{P \text{ IN}}$ $\frac{a + b + c + d + e}{a + b + c + d + e}$ $\frac{2 + 2 + 2 + 2 + 2}{2 + 2 + 2 + 2 + 2}$ $\frac{10}{10}$	=	$\frac{O \text{ OUT}}{O \text{ IN}}$ $\frac{a + b + c + d + e}{a + b + c + d + e}$ $\frac{2 + 2 + 2 + 2 + 2}{2 + 2 + 2 + 2 + 2}$ $\frac{10}{10}$
1		1

The result of this simplistic exercise indicates that Person's outcomes:inputs ratio equals Other's outcomes:inputs ratio. The mathematics of Adams' social exchange theory tells us that the transactions occurring in the health care delivery system at Point One in time have created a stable, equitable state. The system is in balance and is operating smoothly.

Point Two in time is reached. Let it be the case that our hypothetical health care delivery system has switched to the socialized medicine model.

The physician/agency (O) no longer receives fees from the patient (P) in the health care exchange. The algebra becomes:

$\frac{P \text{ OUT}}{P \text{ IN}}$ $\frac{a + b + c + d + e}{a + b + c + d + e}$ $\frac{2 + 2 + 2 + 2 + 2}{0 + 0 + 2 + 2 + 2}$ $\frac{10}{6}$ <p>1.67</p>	$>$	$\frac{O \text{ OUT}}{O \text{ IN}}$ $\frac{a + b + c + d + e}{a + b + c + d + e}$ $\frac{0 + 0 + 2 + 2 + 2}{2 + 2 + 2 + 2 + 2}$ $\frac{6}{10}$ <p>.60</p>
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Distributive justice has been violated. The system is in a state of disequilibrium. Person's ratio exceeds Other's ratio. Social exchange theory predicts what consequences are likely to ensue. The exchange process will move ⁱⁿ the direction of reestablishing equity between the two ratios. In so doing, it can be expected that:

a. Other (physician/agency) will become angry. O will try to increase P's inputs. Since the medical agency is unable to increase fee payment, it must look elsewhere for increased inputs from P. The ante can be upped on P's expenditures of time and inconvenience. Less concern may become shown regarding P's discomfort or suffering. P's insecurity about O's competence may be permitted to fester. In O's anger and resentment he may become prone to decrease P's outcomes. Though he runs into conflict with his own professional ethics, the propositions of social exchange theory would suggest that O may be "encouraged" to lower the quality of care proffered. At the very least, and without ethical compromise, O can see to it that P does not enjoy the privilege of selecting his doctor of choice.

b. O may decrease his own inputs. The level of his care may slip. He may take less time and spend less effort in evaluating the patient. He may become less concerned about the operation of his equipment or the maintenance of his facility. He may decide to refer the patient to another practitioner and in this way halt his input ("dumping" patients).

c. O may try to increase his outcomes. Increasing the amount of fees for services rendered is precluded. Enlargement of his practice is not a "reward" (and therefore not an outcome) in the socialized medicine condition. However, O can work on his reputation and professional status. Perhaps he would elect to do this by "turning academic" or by increasing his degree of specialization. He is left also with trying to feel more altruistic than he might otherwise have to, and may eventually develop protestations of accomplishment and self worth.

d. Or, O may begin to change his frame of reference by which he judges inputs and outcomes. Patients are not really so sick as they say they are. Physicians who work on a fee-for-service basis actually exploit the patient. Full coverage is more important than doctor-patient continuity. Playing golf is good exercise and besides it increases one's efficiency while at work. I am a better judge of what the patient needs than he is. Always give the patient the benefit of a complete workup. Make sure you are "covered." Be certain the paper work is complete.

e. If all else fails to restore equilibrium, O can quit (or be transferred).

At the same time that O is trying to adjust the social exchange process, P is making attempts in his own way. P will:

- a. Feel guilty, ashamed, or unentitled to health care services.

One would expect a stigma of embarrassment or unworthiness to enshroud P as he presents himself as a requestor of medical services. He is now so situated in the exchange relationship that he may be subtly encouraged to "plead" for services.

- b. Increase his inputs and try to increase O's outcomes. P

will now be more willing to pay the price of longer waiting times and added inconvenience in appointment scheduling. While his insecurity about the competency of the physician he is assigned may rise, at least he saw a doctor. His feelings of gratitude toward physicians who helped him through a health crisis may become excessive, and he may take steps to display this gratitude in gifts and personal favors.

- c. Decrease his outcomes and try to decrease O's inputs. P may

now become more willing to accept "incomplete" medical care service. He may lower his expectations regarding his treatment and "handling." He may experience less confidence in his health care agency. He learns to overlook the drop in concern and responsiveness of the medical personnel. He may even feel it "unfair" to call his doctor even though he may need him.

- d. Change his frame of reference by which he judges inputs and

outcomes, or distort his own inputs and outcomes. P's expectations regarding health care standards may drop. Privacy, sensitivity, courtesy, privileged communication are no longer quite so important as they once were. The number of procedures performed, the number of doctors seen, the number of pills taken convince him that he is receiving the best care possible. Since he is getting something for nothing, he can be content with less of the something. He may be encouraged to minimize and "live with" his own discomforts.

Prediction from the theory is that some or all of the above maneuvers by either O or P will take place in an attempt to place the social exchanges on a more equitable footing. What will happen in actual practice, however, is that the "adjustment" will overshoot the mark.

Miller (1972) describes the phenomenon:

A further characteristic of organizations of this sort is that they are unstable, that is, they tend not to return to the predisturbance steady state, but rather experience amplification of an initial disturbance which leads to . . . oscillations of increasing amplitude (p. 114).

Point Three in time is reached. In the attempt to readjust the exchange ratios, but overcompensating instead, let the algebra become:

$\frac{P \text{ OUT}}{P \text{ IN}}$	$\frac{O \text{ OUT}}{O \text{ IN}}$
$\frac{a + b + c + d + e}{a + b + c + d + e}$	$\frac{a + b + c + d + e}{a + b + c + d + e}$
$\frac{1 + 1 + 1 + 1 + 0}{0 + 0 + 3 + 3 + 3}$	$\frac{0 + 0 + 2 + 3 + 3}{1 + 3 + 1 + 1 + 1}$
$\frac{4}{9}$	$\frac{8}{7}$
.44	1.14

<

The tables have turned! P's ratio is now less than O's. This state of affairs will put into play a converse set of maneuvers from those just described. P will become angry, demanding, and rejecting of the medical agency. P will strive to increase his outcomes by dictating the kind of medical care he requires. He may even attempt to prescribe to the physician his own medication. O, on the other hand, will be forced to up his inputs or reduce his outcomes. O may show signs of contrition and attempt to make retribution by announcing expanded services and patient

conveniences.

And so the oscillation process continues--in search of a steady state. Money is the great equalizer, but it has been deleted from the exchange process.

We see, therefore, that the postulates of social exchange theory, when applied to the health care delivery process, have a comment to make. Exchanges occurring within the socialized medicine model operate with a severe handicap. Given the absence of fees paid for services rendered, exchanges seek in vain to reach a state of equilibrium. Distributive justice is the exception rather than the rule, and depending upon the direction of the oscillation one or the other parties in the exchange is quite likely to feel abused at any given point in time.

So far our analysis has suggested a feedback gap and an exchange deficiency in the socialized medicine health care delivery model. It may be that these abstractions may represent the exact same phenomenon, expressed from different conceptual approaches. In any event the problem can also be framed from the viewpoint of reinforcement theory.

Reinforcement Theory and Its Contribution to Understanding Health Care Delivery

A vast literature (e.g., Krasner, 1971), launched by Skinner (1938), and continuing to grow at an exponential rate, attests to the role played by reinforcement in the shaping and maintenance of human behavior. Miller even utilizes the concept of reinforcement in describing the behavior of social systems. He hypothesizes: "A system does not form associations [i.e., does not learn] without (a) feedback . . . and (b) reinforcement . . . " (Miller, 1972, p. 3).

From the work on reinforcement scheduling (e.g., see Ferster and Skinner, 1957) , it is well known that when reinforcement occurs will determine what behavior is maintained. It is the contingency relationship between behavior and reinforcement that is responsible for the survival (or extinction) of behavior.

Salaries (paid to employees within a socialized medicine system) are powerful reinforcers, to be sure, but what behaviors do they reinforce? Paychecks are only loosely contingent upon work performed or services rendered. They are distributed at a predictable, fixed-interval rate and come to be expected by any employee whose behavior is not grossly deviant.

Most authorities agree that the sheer amount of compensation is not nearly so important in determining industrial productivity as the process linking compensation with performance (see Opsahl and Dunnette, 1966). In reviewing work done using tokens as a form of monetary reinforcement, O'Leary and Drabman (1971) reach a similar conclusion: "In short . . . one can imply that the addition of some of the "good things in life" is not sufficient to increase appropriate behavior; the "good things" must be contingent upon "good" behavior to increase its frequency" (p. 390).

The "piece-rate" compensation basis of private medicine permits effective use of money as a reinforcer of "good" health care delivery behavior. In socialized medicine there are no fees and hence no monetary reinforcement for desirable health care delivery behavior. Social reinforcement (i.e., the "evaluations" made by self and others of one's actions) is the principal source of reward for on-the-job behaviors of the salaried employee. But like any reinforcement, to become an effective determiner of desirable behavior social reinforcement must be made contingent upon that behavior.

Recapitulation and Proposed Program Solution

Three different conceptual approaches were employed to study the health care delivery process. A look at the resource flow (which sustains any system) revealed that, because there is no direct resource feedback loop, components in the socialized medicine system are not locked into an interdependent relationship. The specifics of social exchange theory suggested that the socialized medicine health care model invites oscillation in the delivery-receipt process. Monetary reinforcement in socialized medicine is not contingent on desired health care behaviors, thus throwing behaviors in the system to the mercy of relatively unprogrammed social reinforcement.

Each of these approaches point to a common major deficiency in the socialized medicine health care delivery system. In the last analysis it matters little whether we call this deficiency "lack of feedback," "inequitable exchange," or "improperly scheduled reinforcement." In any event, the solution suggested is to fill the void, close the gap, correct the deficiency.

Short of introducing payment of fees for services received and collection of fees for services rendered (a solution which is probably administratively impossible--though some approximation of it may be feasible), we propose development of a program which would substitute information for money.

Information feedback, or "knowledge of results," may be regarded as a type of social reinforcement and therefore is a variable which can be effectively manipulated in endeavors concerned with improving and sustaining

performance. Programmed learning techniques depend almost entirely on information feedback as maintenance reinforcement. Nord (1969b) invites organizations to be more innovative in using social reinforcement, including information distribution, to increase their effectiveness. Locke et al. (1968) state: "The facilitative effect of knowledge of results (KR) upon learning and performance is one of the best established findings in the research literature" (p. 474). Lipe and Jung (1971), in reviewing work on incentive manipulation, include studies that treated information feedback as the independent variable (pp. 255-256).

The respect paid feedback by Miller (1972) has already been noted. His thoughts deserve further attention:

Feedback is necessary also to maintain good human relations in organizations Management should obtain feedbacks about how its decisions are implemented, receiving them quickly enough to institute corrections if they are needed. Management information systems can be designed to provide such information . . . (p. 116).

An organization need not wait until its products are returned, sales diminish, or a reader threatens to horsewhip the editor. Frequently circuits are purposely arranged to obtain faster and more complete feedbacks (p. 116).

the monetary inputs to profit-making corporations, in addition to being cash income, also represent signals about the acceptance of the system's products or services by its environment. . . . Many nonprofit organizations operate without any such clear indication of effectiveness. . . . feedbacks about effectiveness usually flow to nonprofit organizations over tortuous channels. The signals are often limited in usefulness, distorted, and very slow if they arrive at all (p. 114).

In service organizations an important part of the evaluation is from the public that is served . . . (p. 77).

Fort Ord (Datel, 1972; Moore and Tuten, 1975) developed a management information system which anticipated Miller's guidance, above. Each week,

recruits and advanced trainees completed attitude and morale questionnaires. The data from these questionnaires were processed rapidly by automatic data processing procedures and fed back to the trainers/managers/leaders so that they had an opportunity to observe the effects on their followers of their own leadership/management practices. However, the effects of the information feedback process, per se, were not formally studied, i.e., not systematically manipulated as an independent variable.

Also, in a modest but clever experiment, Panyon, Boozer, and Morris (1970) fed information back to ward attendants, in a semi-public manner, on how hard they worked at applying operant treatment procedures to patients. Each attendant received his own feedback and the feedback of his contemporaries. The amount of attendant task performance increased sharply when the public feedback was introduced.

It is herewith submitted, therefore, that a clear argument can be made, both on conceptual grounds and on empirical grounds, for developing a program of formalized information feedback to shape and improve health care delivery services in military medicine contexts (or, for that matter, in any socialized medicine context).

October 1977

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Table 1
PRINCIPAL INPUTS AND OUTCOMES IN HEALTH CARE DELIVERY SYSTEMS

	INPUTS (IN)	OUTCOMES (OUT)
Person (P): (Patient)	<ul style="list-style-type: none"> a. Payment of fees for intangible services b. Payment of fees for tangible goods c. Time/inconvenience d. Discomfort/suffering e. Insecurity about physician/agency competence 	<ul style="list-style-type: none"> a. Receipt of intangible services b. Receipt of tangible goods c. Relief from suffering/discomfort d. Confidence in physician/agency e. Choice of physician; continuity of care
Other (O): (Physician/ agency)	<ul style="list-style-type: none"> a. Intangible health care services (training, expertise, judgement, clinical evaluation, support, presence, etc.) b. Tangible health care goods (lab work, x-rays, medications, records, prostheses, surgical alterations, etc.) c. Time/effort d. Physical plant/equipment e. Designation of physician (referral) 	<ul style="list-style-type: none"> a. Receipt of fees for intangible services b. Receipt of fees for tangible goods c. Development of reputation/enlargement of practice d. Sense of having contributed to patient's comfort/well being e. Sense of accomplishment/mastery